



# UNITED STATES PATENT AND TRADEMARK OFFICE

*pen*  
UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/528,174	03/17/2005	Manabu Inoue	8861-520US (P35017-01)	6507

570 7590 09/06/2006

AKIN GUMP STRAUSS HAUER & FELD L.L.P.  
ONE COMMERCE SQUARE  
2005 MARKET STREET, SUITE 2200  
PHILADELPHIA, PA 19103

EXAMINER

AMRANY, ADI

ART UNIT	PAPER NUMBER
----------	--------------

2836

DATE MAILED: 09/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/528,174

Applicant(s)

INOUE ET AL.

Examiner

Adi Amrany

Art Unit

2836

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 March 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 March 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 3/17/05.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date: \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Specification***

1. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Furthermore, it is requested that the applicant shorten the Summary of the Invention by editing and/or removing the lengthy and redundant descriptions/embodiments of the invention. The Summary, consisting of the Background Art and the Disclosure of Invention, is 42 pages long. Please see MPEP §608.01(d).

### ***Claim Objections***

2. A series of singular dependent claims is permissible in which a dependent claim refers to a preceding claim which, in turn, refers to another preceding claim.

A claim which depends from a dependent claim should not be separated by any claim which does not also depend from said dependent claim. It should be kept in mind that a dependent claim may refer to any preceding independent claim. In general, applicant's sequence will not be changed. See MPEP § 608.01(n).

Claims 10 and 11 depend on claim 8, but are preceded by claim 9, which depends on claim 1. Claims 10-13 should precede claim 9.

***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 8 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 8 recites that the converter control section causes the DC-DC converter to perform one of the buck and boost operations, yet at the same time, maintains the DC-DC converter in non-operation. The DC-DC converter can't be OFF if it is ON.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 3-8 and 14-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Ikeda (US 5,161,097).

With respect to claim 1, Ikeda discloses a direct-current power supply (figure 1) comprising:

a DC-DC converter (figure 1, item 2; column 3, lines 16-21), by its switching operation ("chopper controlled"), converting an input voltage applied from an external direct-current power supply (figure 1, item 1) into an output

voltage equal to or higher than the input voltage ("booster type"), and applying the output voltage to an external load (figure 1, item 3);

a converter control section (figure 1, item 2; column 3, line 42 to column 4, line 12) comparing said output voltage with a desired voltage, and based on their difference, controlling said switching operation of said DC-DC converter;

a bypass switch (figure 1, item 4; column 3, lines 21-27) shorting between the input and output of said DC-DC converter; and

a bypass control section (figure 1, items 5, 6; column 4, lines 13-24) maintaining said bypass switch in the ON state during non-operation of said DC-DC converter, and at a start of said switching operation of said DC-DC converter, further maintaining said bypass switch in the ON state for a predetermined time from the start (figure 1, items 5, 6).

The specification discloses that the bypass control section is a comparator (figure 1, item 6; page 56, line 12 to page 57, line 14) and that the bypass control section maintains the bypass switch in the ON state for a predetermined time (" $T_f$ "; page 62, lines 7-15). The Ikeda bypass control section comprises a comparator (item 5), as in the present application, and further comprises a controller (item 6). These components combine to act as a switching delay for the bypass switch.

With respect to claim 3, Ikeda discloses the direct-current power supply according to claim 1, and further discloses:

said direct-current power supply comprises a start control section (figure 1, items 5, 26; column 3, lines 54-57; column 4, lines 8-12) sending a

predetermined start signal to said converter control section based on one or both of said input and output voltage (column 4, lines 3-8); said converter control section in non-operation starts upon receipt of said start signal (column 4, lines 8-12); and

said bypass control section includes:

a signal delay section (figure 1, item 5; column 4, lines 13-15)

holding said start signal for a predetermined delay time from the instant of receipt; and

a switch driving section (figure 1, item 6; column 4, lines 15-19)

maintaining said bypass switch in the ON state until the receipt of said start signal from said signal delay section (column 3, lines 26-27), and turning off said bypass switch at the receipt of said start signal.

Ikeda anticipates the signal delay section, as discussed above.

With respect to claim 4, Ikeda discloses the direct-current power supply according to claim 3, and further discloses:

said start control section sends a predetermined stop signal to said converter control section, based on said input voltage (column 4, lines 8-12);

said converter control section in operation stops upon receipt of said stop signal (column 4, lines 8-12); and

in said bypass control section:

said signal delay section holds said stop signal for a predetermined delay time from the instant of receipt (figure 1, item 5; column 4, lines 13-15); and

said switch driving section maintains said bypass switch in the OFF state until the receipt of said stop signal from said signal delay section (column 3, lines 26-27), and turning on said bypass switch at the receipt of said stop signal (column 4, lines 15-19).

Ikeda anticipates the signal delay section, as discussed above.

With respect to claim 5, Ikeda discloses the direct-current power supply according to claim 1, and further discloses:

said direct-current power supply comprises an input voltage detecting section (figure 1, items R3, R4; column 3, line 67 to column 4, line 3) comparing said input voltage with a start input voltage;

said converter control section, based on the output of said input voltage detection section:

maintains said DC –DC converter in non-operation during the period when said input voltage is higher than said start input voltage (column 4, lines 3-5 and 9-12); and

causes said DC-DC converter to start said switching operation at the detection of the fall of said input voltage to said start input voltage (column 4, lines 5-7).

With respect to claim 6, Ikeda discloses the direct-current power supply according to claim 1, and further discloses:

an input voltage detecting section (figure 1, items R3, R4; column 3, line 67 to column 4, line 3) comparing said input voltage with a stop input voltage (Vb);

an output voltage detecting section (figure 1, items R1, R2; column 3, lines 54-57) comparing said output voltage with a start output voltage (Va); and

a start control section (figure 1, items 5 and 26; column 3, lines 54-57; column 4, lines 8-12):

based on the output of said output voltage detecting section, maintaining said converter control section in non-operation during the period when said output voltage is higher than said start output voltage, and causing said converter control section to start at the detection of the fall of said output voltage to said start output voltage (column 3, lines 57-66).

based on the output of said input voltage detecting section, maintaining said converter control section in operation during the period when said input voltage is lower than said stop input voltage, and causing said converter control section to stop at the detection of the rise of said input voltage to said stop input voltage (column 4, lines 3-12).



With respect to claim 7, Ikeda discloses the direction-current power supply according to claim 6, and further discloses said start control section, based on the outputs of said input voltage detecting section and said output voltage detecting section:

maintains said converter control section in non-operation during the period when said input voltage is higher than said stop input voltage (column 4, lines 3-12) and output voltage is higher than said start output voltage; and

causes said converter control section to start when said input voltage falls below said stop input voltage (column 4, lines 3-12) and the fall of said output voltage to said start output voltage is detected (column 3, lines 57-66).

Ikeda discloses that the input voltage detecting section alone maintains the converter control section in non-operation without reference to the state of the output voltage detecting section. Only one signal is required to turn the converter off. Without a control signal applied to the oscillator (figure 1, item 25), the converter is non-operative regardless of the output voltage. When the input voltage detecting section causes the converter control section to operate, then the operation of the converter is further dependent on the state of the output voltage detecting section.

With respect to claim 8, Ikeda discloses the direct-current power supply according to claim 1, and further discloses:

said DC-DC converter has the ability of buck operation (column 4, lines 25-31) converting said input voltage into said output voltage equal to or lower than the input voltage, in addition to the ability of boost operation converting said input voltage into said output voltage equal to or higher than the input voltage;

said converter control section, based on the difference between said output voltage and said desired voltage, causes said DC-DC converter to perform one of said buck operation and boost operation *and maintains said DC-DC converter in non-operation*; and

at the start of the boost operation of said DC-DC converter, said bypass control said further maintains said bypass switch in the ON state for a predetermined time from the instant of the start (column 4, lines 13-24).

The delay of the bypass control is discussed above in the rejection of claim 1. Ikeda discloses that the converter is initially configured in buck operation while the voltage of the battery is excessively high. After the output of the battery has dropped to an appropriate level, the converter is configured in boost operation.

With respect to claim 14, Ikeda discloses a battery-powered electronic apparatus (figure 1) comprising:

a battery supplying a predetermined battery voltage (figure 1, item 1; column 3, lines 16-21); and

a direct-current power supply (figure 1) comprising:

a DC-DC converter (figure 1, item 2; column 3, lines 16-21), by its switching operation ("chopper controlled"), converting said battery voltage into an output voltage equal to or higher than the battery voltage ("booster type");

a converter control section (figure 1, item 2; column 3, line 42 to column 4, line 12) comparing said output voltage with a desired voltage, and based on their difference, controlling said switching operation of said DC-DC converter;

a bypass switch (figure 1, item 4; column 3, lines 21-27) shorting between the input and output of said DC-DC converter; and

a bypass control section (figure 1, items 5, 6; column 4, lines 13-24) maintaining said bypass switch in the ON state during non-operation of said DC-DC converter, and at a start of said switching operation of said DC-DC converter, further maintaining said bypass switch in the ON state for a predetermined time from the start (figure 1, items 5, 6).

Ikeda discloses the bypass control maintains the bypass switch ON for a predetermined time from the start, as discussed above in the rejection of claim 1.

With respect to claim 15, Ikeda discloses the battery-powered electronic apparatus according to claim 14, and further discloses said battery voltage falls below said desired voltage in the middle of discharge of said battery (column 2, lines 2-4; column 4, lines 32-44).

### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 2 and 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda.

With respect to claim 2, Ikeda discloses the direct-current power supply according to claim 1, but does not expressly disclose said bypass control section compares said input voltage with *said output voltage*, and turns on and off said bypass switch when said input voltage is higher and lower than *said output voltage*, respectively.

Ikeda discloses that the bypass control section compares the input voltage with a reference voltage (figure 1, item "Vb"), and turns on and off said bypass switch when said input voltage is higher and lower than the reference voltage (column 3, lines 27-41, "Vs"). The voltage source Vb in figure 1 is the same as the reference voltage Vs in figure 2 (column 4, lines 1-2).

It would have been obvious to a person of ordinary skill in the art to replace the Ikeda reference voltage (Vb/Vs) with the output voltage (Vo), as used in the present application, because when the bypass switch is ON, the output voltage is equal to the input voltage. In the present application, the converter is turned on when the output voltage reaches a reference value (ET; figure 3a).

With respect to claim 11, Ikeda discloses the direct-current power supply according to claim 8. Ikeda does not expressly disclose a stop switch. It would have been obvious to a person of ordinary skill that the Ikeda power supply comprises a stop switch operated under an on-off control of said external load and cutting off one of an input current provided from said external direct-current power supply and an output current provided for said external load. Ikeda discloses that the power supply is for use with a cordless electronic appliance (column 1, lines 15-22). It would be obvious to one

skilled in the art that these cordless electronic appliances comprise a stop switch operated under an on-off control of said external load (the appliance) to disconnect the battery from the load. The motivation for doing so would have been to allow the user to turn the appliance off, and therefor, preserve battery power during periods of non-use.

With respect to claims 12-13, Ikeda discloses the direct-current power supply according to claim 11, and further, it would have been obvious to a person of ordinary skill to provide the stop switch at the back end (claim 12; "a node near said external load between said DC-DC converter and said bypass switch") or the front end (claim 13; "a node near said external direct-current power supply between said DC-DC converter and said bypass switch") of the power supply, in order to disconnect the battery from the load. Disconnecting the current path at the back end (adjacent the smoothing capacitor and load) or the front end (adjacent the battery) will have the same effect of discontinuing power supply from the battery to the load, because in either embodiment, the current path no longer comprises a complete circuit.

9. Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda in view of Vinciarelli (US 6,975,098).

With respect to claim 9, Ikeda discloses the direct-current power supply according to claim 1. Ikeda discloses a rectifying diode (figure 1, item 23), but does not expressly disclose a synchronous rectifier section performing rectification during operation of said DC-DC converter in synchronization with its switching operation, and maintaining the ON state during non-operation of said DC-DC converter.

Vinciarelli discloses a switching DC-DC converter comprising a synchronous rectifier (column 21, line 65 to column 22, line 22).

Ikeda and Vinciarelli are analogous because they are from the same field of endeavor, namely switching DC-DC converters. At the time of the invention by applicants, it would have been obvious to a person of ordinary skill in the art to combine the direct-current power supply disclosed in Ikeda with the synchronous rectifier disclosed in Vinciarelli. The motivation for doing so would have been to reduce switching losses.

With respect to claim 10, Ikeda discloses the direct-current power supply according to claim 8, but does not expressly disclose a synchronous rectifier. Vinciarelli discloses a DC-DC converter comprising a synchronous rectifier, as discussed above.

10. Claims 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda in view of Rose (US 5,297,203).

With respect to claim 16, Ikeda discloses the battery-powered electronic apparatus according to claim 14. Ikeda discloses that the apparatus comprises a cordless electronic appliance (column 1, lines 15-19), but does not expressly disclose the apparatus comprises a wireless transmitter section sending a signal by radio waves to the outside.

Rose discloses a cordless electronic appliance (figure 1; column 16, lines 11-13) operating on battery power (column 16, lines 24-27), further comprising a wireless transmitter (figure 1, item 101; column 16, lines 13-18) section sending a signal by radio waves to the outside.

Ikeda and Rose are analogous because they are from the same field of endeavor, namely battery-powered wireless electronic appliances. At the time of the invention by applicants, it would have been obvious to a person of ordinary skill in the art to combine the battery-powered electronic apparatus and direct-current power supply disclosed in Ikeda with the wireless battery-powered electronic appliance disclosed in Rose. The motivation for doing so would have been to utilize the direct-current power supply to extend the batter life of the wireless appliance.

With respect to claim 17, Ikeda and Rose disclose the battery-powered electronic apparatus according to claim 16, and Rose further discloses said wireless transmitter section includes a power amplifier section (figure 2, item 130; column 17, lines 15-22) amplifying a signal to be sent under the application of said output voltage of said DC-DC converter. Further, it is inherent that the signal is sent under the application of the output of the converter because the wireless appliance only contains one power source, the battery and converter, as disclosed in Ikeda.

### ***Conclusion***

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.


- a. Ingman (US 6,069,804) discloses a conventional DC-DC converter comprising a synchronous rectifier (column 4, liens 35-39).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Adi Amrany whose telephone number is (571) 272-0415. The examiner can normally be reached on weekdays, from 9am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Sircus can be reached on (571) 272-2800 x36. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AA



BURTON S. MULLINS  
PRIMARY EXAMINER